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#### **REMARKS**

The present response is intended to be fully responsive to all points of objection and/or rejection raised by the Examiner and is believed to place the application in condition for allowance. Applicant asserts that the present invention is new, non-obvious and useful. Favorable reconsideration and allowance of the claims is respectfully requested.

#### **Status of Claims**

Claims 10-35 are pending in the application.

Claims 10 and 12-35 have been amended herein. Applicant respectfully asserts that no new matter has been added by the amendments.

#### **Claim Objections**

In the Office Action, the Examiner objected to Claims 13, 20, 23, 27-32 and 35 under 37 C.F.R 1.75(c), as being improper dependent claims for failing to further limit the subject matter of a previous claim.

Regarding claims 13 and 20, the Examiner asserts that these claims fail to further narrow the scope of claims 12 and 19 from which they depend. In accordance with the Examiner's observations, Applicant has herein amended claims 13 and 20 to limit the security price in claims 12 and 19 to be index prices in claims 13 and 20, respectively.

Regarding claim 23, the Examiner recommends the language of the claim be amended to more clearly reflect method steps, as "the method ..., further comprising calculating a price of the option at a node at the same time as the node vega for said node is calculated." Accordingly, Applicant has herein amended claim 23 to substantially mirror the language suggested by the Examiner.

Regarding claim 27, the Examiner recommends inserting the word "further" following "... Claim 17,...". Applicant has herein amended claim 27 in accordance with the Examiner's recommendation.

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Regarding claims 28 and 35, the Examiner suggests inserting the word “binomial” to describe the tree in the claims. However, as described on page 9 lines 1-3 of the Application as filed, embodiments of the invention apply to “all tree-based … models” and therefore, need not be limited to binomial trees. Accordingly, the word “binomial” is deleted from claims 10, 17, 24, 25, 33 and 34.

Regarding claims 29-32, the Examiner asserts that dependent claims 29-30 and 31-32 do not further narrow the scope of independent claims 10 and 17, as the independent claims 10 and 17 do not present the concept of computing a value for node vega when an option *is* exercised and when an option is *not* exercised, respectively (emphasis added). Applicants disagree, asserting that although the concepts of computing a value for node vega *when an option is or is not exercised* are not present in independent claims 10 and 17, the language *when an option is or is not exercised* need not be present in the independent claims 10 and 17 for claims 29-32 to narrow the scope thereof and, in fact, claims 29-32 do further narrow the scope of independent claims 10 and 17. Independent claims 10 and 17 present the concept of computing a value for node vega at each node. Claims 29-32 further define the computation of the value for node vega at the nodes according to respective equations to further narrow the independent claims 10 and 17 from which they depend. The fact that claims 29-32 describes that such narrowing limitations occur in specific instances (when an option is or is not exercised) is irrelevant to the fact that claims 29-32 narrow the computation of the value for node vega defined in claims 10 and 17. Therefore, claims 29-32 meet the requirement under 37 C.F.R. 1.75(c).

Furthermore, the Examiner asserts that it is unclear as to whether the equations in claims 29-32 are the same as the language in claims 11, 12 18 and 19. Accordingly, Applicant has herein amended claims 29-32 to depend from claims 11, 12 18 and 19, respectively, to clarify the relationships therebetween.

Regarding claim 35, the Examiner suggests amending the claim to read “further” following “... is configured to iteratively calculate ... for the binomial trees, using the Newton-Raphson method.” Applicant has herein amended claim 35 in accordance with the Examiner’s recommendation.

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Accordingly, Applicant respectfully requests that the Examiner withdraw the objection to the claims.

#### **CLAIM REJECTIONS**

##### **35 U.S.C. § 112 Rejections**

In the Office Action, the Examiner rejected Claims 10-35 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 10, 17 and 28, the Examiner asserts that the meaning of a single volatility for all nodes is unclear. Accordingly, Applicant has amended claims 10, 17 and 28 to recite “a single value of volatility that is the same for all nodes in the [ ] tree.” Furthermore, the Examiner asserts that the meaning of a single volatility and new volatility is unclear. Applicants disagree. Volatility is a well-understood term in the field and a person of skill in the art would easily understand the meaning of a single value of volatility and a new value of volatility as it is used in the claims and in light of the specification. Furthermore, regarding the 3<sup>rd</sup> clause of claim 28 and claim 35, the Examiner asserts that it is unclear as to how the binomial trees are interrelated. Applicants note that the relationship between the trees is defined, according to an embodiment of the invention, in the 1<sup>st</sup> clause of claim 28. In the 3<sup>rd</sup> clause of claim 28 and in claim 35, the implied volatility of the option is calculated using the values calculated for vega for the trees. This calculation may be achieved by various methods, the details of which are fully set forth in the Specification and claims. In the embodiment of claim 35, the Newton-Raphson method is used, while page 6 lines 20-25 of the Specification as filed teaches that, according to some embodiments, any numerical optimization method may be used, for example, in which a model is run iteratively with new values of volatility ( $\sigma$ ) until the price of the option converges. These details are not required to be included in the independent claims 10, 17 and 28.

Regarding claims 12 and 13, the Examiner asserts that “the security price” and “the index price” lack antecedent basis. In accordance with the Examiner’s observations,

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Applicant has hereby amended claims 12 and 13 to recite “a security price” and “an index price,” respectfully. The same corrections are made to claims 18 and 19.

Regarding claim 14, the Examiner asserts that it is unclear as to which “node vega” Applicant is referring to, as there are multiple node vegas in a single binomial tree. Applicants disagree. Node vega may be a type of value or a function, which, like any other function, may attain different values at different nodes. Thus, multiple new values may be computed for node vega in each iteration.

Regarding claims 15 and 22, the Examiner asserts that “the new values for implied volatility” lacks sufficient antecedent basis. In accordance with the Examiner’s observations, Applicant has hereby deleted “the new values” from claims 15 and 22.

Regarding claim 21, the Examiner asserts that it is unclear for which nodes new node vega is calculated and as to what values “new values” refers. Accordingly, Applicant has herein amended claim 21 to recite “computing new values for node vega at the nodes in each iteration.”

Regarding claim 29, the Examiner asserts that it is unclear as to what “when an option is not exercised” modifies. Accordingly, Applicant has herein amended claim 29 clarify the meaning of the claim. A similar amendment is made to claim 30.

Regarding claims 31 and 32, the Examiner suggests amending the claim language to read “... Claim 17, further comprising, when the option is [is not] exercised at a sub-period ... node, computing the value for node vega at the node as: ...” However, Applicant believes that such amendments may confuse the meaning of the claims. The base claim 17 includes a step of “computing a value for node vega at each node”, and the limitations referred to in claims 31 and 32 are meant to modify that step of claim 17 indicated by the language “wherein”. Using the language “further comprising ... computing” may indicate that the computation referred to in claims 31 and 32 are executed as a different or additional steps from the computing step of claim 17, which is not Applicant’s intention.

Regarding claims 29, 31, 33 and 34, the Examiner asserts that these claims are unclear because all the terms of the present equation are not defined in the claim. In accordance with

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the Examiner's observations, Applicant has amended claims 29, 31, 33 and 34 to define all terms in their equations.

#### **Conclusion**

In view of the foregoing amendments and remarks, Applicant asserts that the pending claims are all allowable. Should the Examiner have any question or comment as to the form, content or entry of this paper, the Examiner is requested to contact the undersigned at the telephone number below. Similarly, if there are any further issues yet to be resolved to advance the prosecution of this application to issue, the Examiner is requested to telephone the undersigned counsel.

In addition, the Commissioner is hereby authorized to debit any and all fees due in connection with this submission and application from our Deposit Account No. 50-3355.

Favorable reconsideration of the application and allowance are respectfully requested.

Respectfully submitted,

  
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